UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/898,162 | 07/03/2001 | Amit Anil Nanavati | JP920010141US1 | 2569 |

7590        11/13/2006

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| EXAMINER |
|---|
| NGUYEN, STEVEN H D |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2616 | |

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 09/898,162 | NANAVATI ET AL. |
| | Examiner | Art Unit | |
| | Steven HD Nguyen | 2616 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on <u>04 September 2006</u>.

2a)☒ This action is **FINAL**.     2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) <u>22-42</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>22-42</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2.      Claims 22-42 rejected under 35 U.S.C. 103(a) as being unpatentable over Salonidis (USP

6865371) in view of Johansson (US 2002/0044549) and Chatterjee (IEEE).

Regarding claims 22, 26, 28, 30, 34, 36, 38 and 42, Salonidis discloses a method for

optimal clustering of master-slave ad-hoc wireless network, said method comprising assigning

any of master and slave status to each node and connecting slave nodes in said wireless network

to master nodes in said wireless network to form subgroups comprising a bounded size;

interconnecting said subgroups through non-center nodes in said wireless network to form a

single cluster using any of connecting a slave node at the boundary of one subgroup to the master

of an adjacent subgroup; connecting two adjacent master nodes together; and converting a slave

node at said boundary to a master node and linking the converted node to any of slave nodes and

master nodes in adjacent subgroups; minimizing the number of master nodes in said wireless

network by the interconnection of said subgroups based on said defined optimization parameters

(Col. 12, lines 10-50, phase I, the coordinator node has a view of the nodes in the network being

similar to star network because bluetooth a star shaped network, Phase II assigning status to the

nodes in the network such as master, bridge or salve based on the constraints, Phase III connects

the master to slaves, master-slave-master, master-master of the piconet in order form a single

scatternet, Col. 13, line 65 to col. 14, lines 10) and said star-shaped graphical format, an edge

between a pair of said nodes in said wireless network occurs if said pair of nodes are in radio

range of each other. and wherein said each node discovers other nodes within said radio range in

said wireless network using device discovery protocols (col. 4, lines 10-23, the node use

discovery protocol to from a star shaped). However, Salonidis fails to fully disclose the

connected network. In the same field of endeavor, Johansson discloses a method and system for

optimal clustering of master-slave ad-hoc wireless network comprising interconnecting said

subgroups to form a single cluster either by connecting a slave node at the boundary of one

subgroup to the master of an adjacent subgroup where possible (slave 720 in piconet 1 to the

master M2 in piconet 2 in fig. 7), or by connecting two adjacent master nodes together (Master

M2 in piconet 2 to the master M3 in piconet 3 in fig. 7) or by converting a slave node (M4 was a

slave in piconet 2 but master in TS1) to at the boundary to a master and linking it to the slave

nodes or master nodes in the adjacent subgroups (M4 to M2) and said star-shaped graphical

format, an edge between a pair of said nodes in said wireless network occurs if said pair of nodes

are in radio range of each other. and wherein said each node discovers other nodes within said

radio range in said wireless network using device discovery protocols (page 2, [0013], discovery

feature allows a node to hear the other nodes within its range). Since, Johansson suggests a well-

known method with centralized mechanism for forming a maximum Connectivity Scatternet

(subgroup) has been used ([0068]) and Salonidis suggests the piconets coupled by the bridge

node to form a scatternet. However, Johansson and Salonidis differs from the claimed invention

in that the modified assembly does not specifically teach that modeling all nodes in said wireless

network in a star-shaped graphical format; assigning a weight to said all nodes, wherein said

weight is a function of defined optimization parameters comprising an amount of neighbor nodes

of each said node, a power consumption of said node, and a maintenance overhead associated

with said node; updating said weight of said all nodes at each occurrence of a removal of an edge

of each node marked as any of said master node and said slave node. In the same field of

endeavor, Chatterjee discloses modeling all nodes in said wireless network in a star-shaped

graphical format (Page 1698, Sec 2); assigning a weight to said all nodes, wherein said weight is

a function of defined optimization parameters comprising an amount of neighbor nodes of each

said node, a power consumption of said node, and a maintenance overhead associated with said

node (Pages 1698-1700, Sec III, assigning a weight for each node based on the number of nodes,

power and mobility "overhead" and selecting the clusterheads based on these values in order to

minimize the number of clusterhead nodes in the network); updating said weight of said all

nodes at each occurrence of a removal of an edge of each node marked as any of said master

node and said slave node (Page 1701, Sec V) and minimizing the number of master nodes in said

wireless network by the interconnection of said subgroups based on said defined optimization

parameters (Pages 1698-1700, Sec III) and said star-shaped graphical format, an edge between a

pair of said nodes in said wireless network occurs if said pair of nodes are in radio range of each

other. and wherein said each node discovers other nodes within said radio range in said wireless

network using device discovery protocols (Page 1698, Sec II, the nodes in the graph can hear

each other because its is within transmission range).

Since, Salonidis suggests a method and system for using the criteria of nodes when

forming the scatternet. Therefore, it would have been obvious to one of ordinary skill in the art

at the time of the invention was made to apply a method for using the constraints to select a

minimum number of the clusterhead nodes and updating these constrains when a node move out

of the reach of the network as disclosed by Chatterjee in to the teaching of Johansson which

discloses a well known method for forming a scatternet by connecting the nodes of the piconets

into the teaching of Salonidis. The motivation would have been to improve throughput and

reduce the latency.

Regarding claims 23, 31 and 39, Salonidis further discloses that each node is assigned

master or slave based on the degree of connectivity of said node with other unassigned nodes

(col.4 lines 14-23).

Regarding claims 24, 32 and 40, Salonidis further teaches the assignment is implemented

by a single entity (the "coordinator") located either within the cluster as one of the nodes (as a

"master" when one piconet is formed; col. 12 lines 7-10) or outside the cluster (outside the

piconet when the coordinator assigns a node as another master to form a new piconet; col. 12

lines 11-17).

Regarding claims 25 and 33, although the assembly of Johansson, Salonidis and

Chatterjee do not specifically points out that the formation of clusters and interconnection

between the said clusters is based on weight associated with each node in the network where the

weight of a node depends upon the number of nodes in its neighborhood, however Johansson and

Salonidis both disclose the neighbor nodes inquiring ([0013] in Johansson and col. 1 lines 58-60

in Salonidis). Specifically, Johansson teaches that ad-hoc networks are dynamic, ad-hoc

networking technology typically has a neighbor discovery feature. The neighbor discovery

feature allows one node to find any other node within radio range with which the first node can

communicate with and consequently form an ad-hoc network with ([0013]). Further more,

Johansson teaches that scatternets should be formed by maximum connectivity, i.e. maximum

connectivity scatternet (MCS) ([0024]). It would have been obvious for one of ordinary skill in

the art to understand that the "maximum connectivity" depends on the number of neighboring

nodes, for example, the nodes with the largest number of neighbors should serve as masters.

Therefore, it would have been obvious for one of ordinary skill in the art at the time when the

invention was made to incorporate the formation of clusters and interconnection between the said

clusters based on weight associated with each node in the network where the weight of a node

depends upon the number of nodes in its neighborhood in the assembly of Johansson, Salonidis

and Chatterjee in order to identify the nodes and form efficient scatternets.

Regarding claims 27, 35 and 41, Johansson further disclose a method/system with a

distributed manner at each node further comprising: assigning master or slave status to itself by

each node based on the master or slave or unassigned status of all neighboring connected nodes

(figs. 9A-9C and the corresponding descriptions), forming subgroups around each master node

(figs. 9A-9C and the corresponding descriptions), merging said subgroups by forming slave-

slave bridges (slave S2 in piconet 1 to the slave D2 in piconet 2 in fig. 7) or slave-master bridges

(slave 720 in piconet 1 to the master M2 in piconet 2 in fig. 7) or master-master bridges (Master

M2 in piconet 2 to the master M3 in piconet 3 in fig. 7) wherever possible based on network

constraints or by forming additional masters where necessary.

Regarding claim 29 and 37, Chatterjee discloses minimizing the number of

communication hops in said wireless network based on the minimal number of master nodes in

said wireless network (Page 1698, Sec III, minimum number of clusterhead implies a minimum

number of hops).

## *Conclusion*

3.      Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action.  Accordingly, **THIS ACTION IS MADE FINAL**.  See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action.  In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action.  In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this
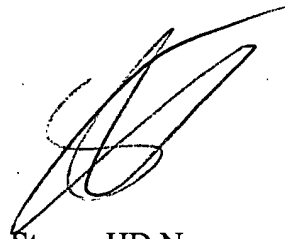
final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Steven HD Nguyen whose telephone number is (571) 272-3159.

The examiner can normally be reached on 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Wellington Chin can be reached on (571) 272-3134.  The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system.  Status information for published applications

may be obtained from either Private PAIR or Public PAIR.  Status information for unpublished

applications is available through Private PAIR only.  For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Steven HD Nguyen
Primary Examiner
Art Unit 2616
November 3, 2006